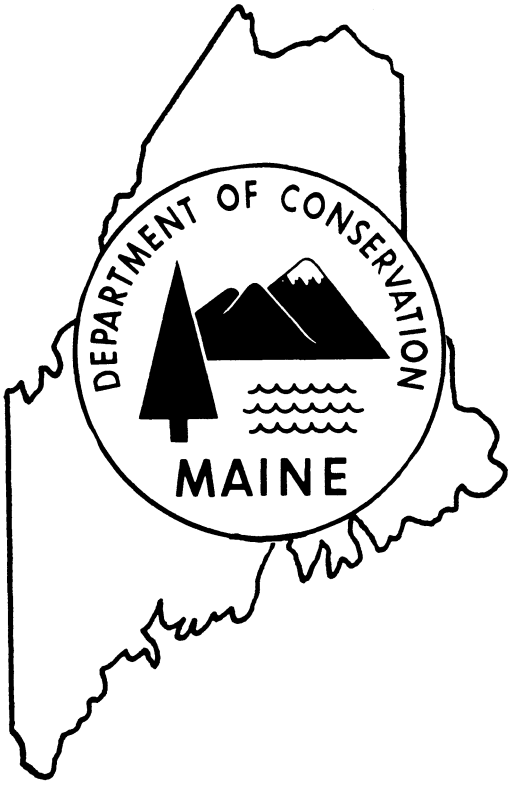
# FOREST & SHADE TREE INSECT & DISEASE CONDITIONS

# FOR MAINE

## A Summary of the 1988 Situation




Insect & Disease Management Division
Summary Report No. 3
March 1989

Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Augusta, Maine

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# FOREST & SHADE TREE INSECT & DISEASE CONDITIONS FOR MAINE
# A SUMMARY OF THE 1988 SITUATION

While pest conditions for 1988 were roughly analogous to those experienced in 1987, increasing attention was focused on various declines and drought stress. Much of the I & DM staff time was devoted to impact studies associated with the various declines and in development of more effective sampling techniques. Shifting program emphasis along with staffing changes continued to provide administrators and staff with challenges in 1988. While the near future appears to hold much of the same in store, there is an increasingly functional system of cooperation developing between those groups and agencies with similar interests. Continued cooperation and mutual support will insure the development of practical solutions to many of our pressing problems affecting trees in both urban and forestry situations.

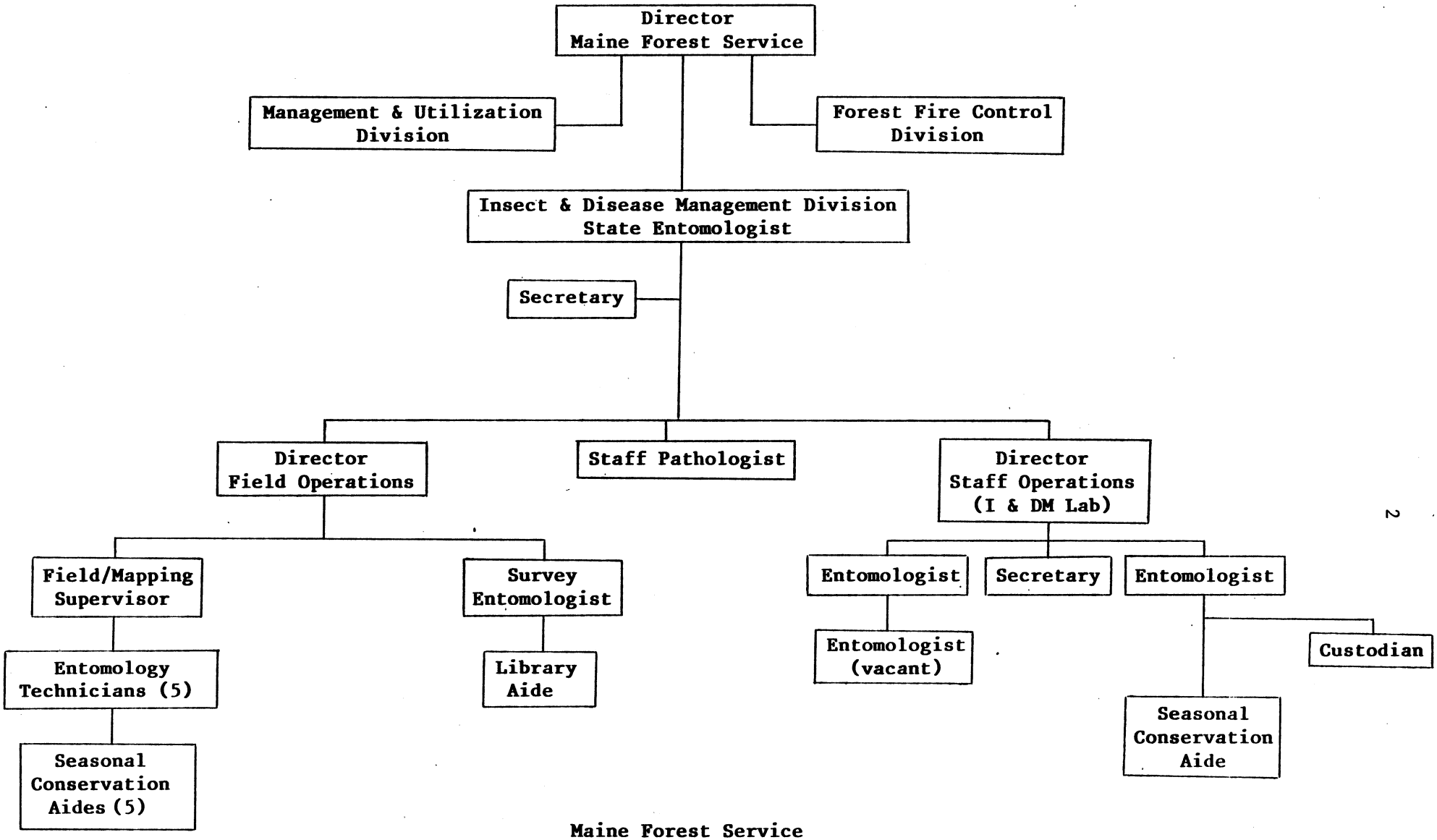
## Highlights of Division Activities for 1988

Staff changes during 1988 were significant. The loss of two of our more experienced professionals and frequent shifts in many of the remaining staff required frequent readjustments in areas of responsibility.

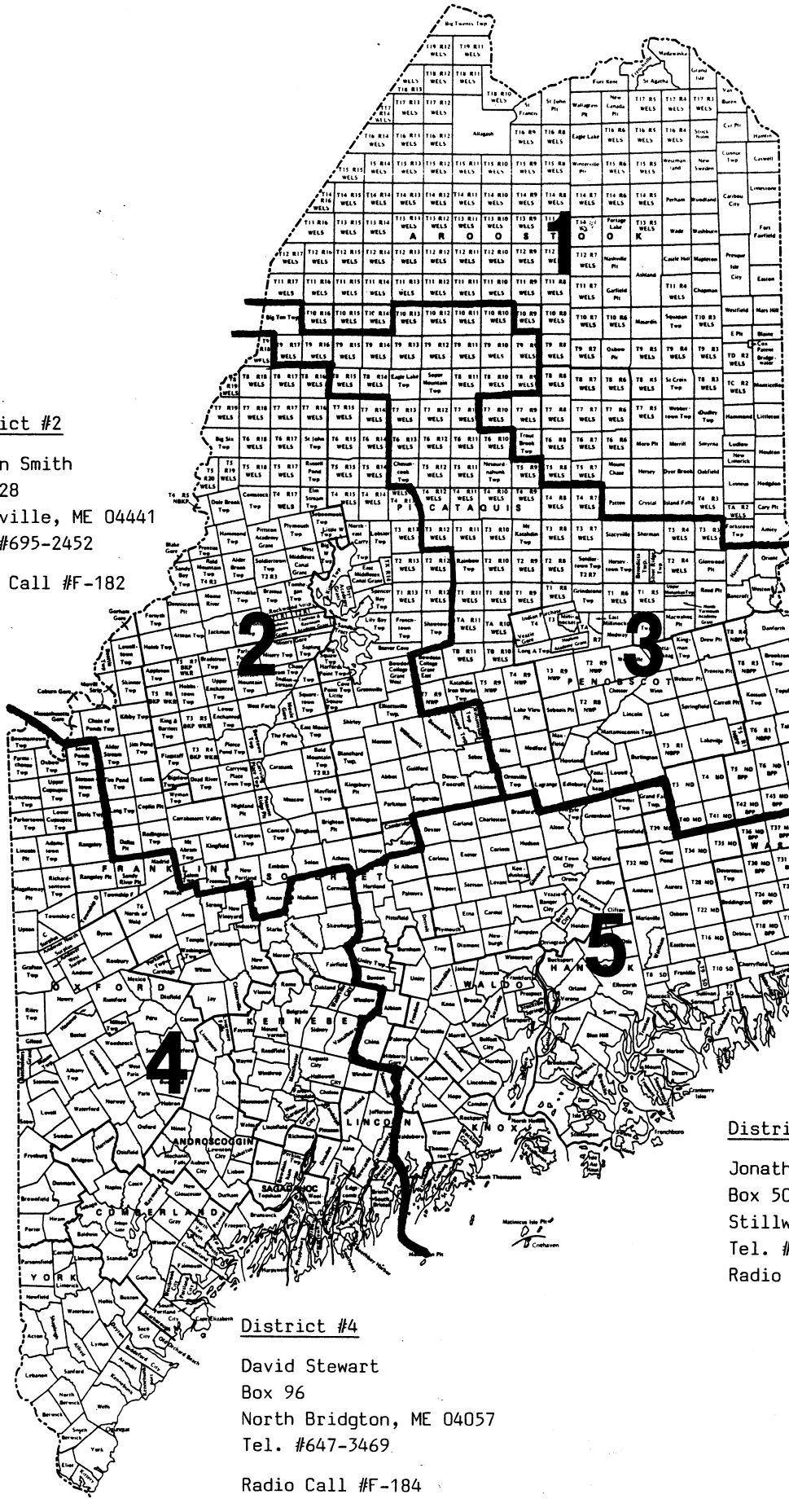
The retirement of our forest pathologist, Douglas A. Stark in February (See seasonal conditions report 88-2 for May 16, 1988) was followed by another blow with the passing of entomologist George A. LaBonte in July (See seasonal conditions report 88-6 for July 26, 1988). Although program responsibilities were shifted to compensate for these vacancies functionally, our capabilities received a serious setback. The nearly 70 years of combined Maine forestry experience will be hard to replace. Dr. Clark A. Granger will be filling in for Doug as forest pathologist but will spend much of his time on the white pine blister rust program and diseases of Christmas trees. Much of George LaBonte's work on hardwoods was handled in 1988 by Dave Struble and the softwood problems by Richard Bradbury.

The State Entomologist position underwent a series of changes following the resignation of Thomas Rumpf in January. Henry Trial, Jr. filled the position temporarily until Thomas Morrison accepted the assignment in June. Tom served through October when he temporarily and then permanently accepted the position of Director of the Bureau of Public Lands. Dave Struble then filled in for Tom. In spite of these organizational changes, most of our programs have continued with little disruption in service to our constituents, thanks to a very dedicated professional and field staff who were willing to go that extra mile.

The following chart presents our current staff organization and the technician district map includes modifications made during the 1988 season.




Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Insect & Disease Management Division
Organizational Chart
March 1989

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Entomology Technician
Districts
March 1989

## Publications

The I & DM Division continues to maintain and upgrade a file of published reports, bulletins, brochures and information leaflets and sheets on programs and pests of importance to Maine's tree resources, both forest and urban. Through our seasonal condition reports our readers are apprised of current pest developments, and our summary issues provide information which can be useful for planning purposes.

In addition to the standing file of materials, the following new items have been published over the past year:

Bradbury, R.L. 1989 (January). An Economic Assessment of the White Pine Blister Rust Control Program in Maine. Me. Dept. of Conserv., Me. For. Serv., I & DM Division. Tech. Rpt. No. 27. 17 pp.

Insect & Disease Management Division. 1988 (March). Forest & Shade Tree Insect & Disease Conditions for Maine - A Summary of the 1987 Situation. Me. Dept. of Conserv., Me. For. Serv., I & DM Division. Summary Rpt. No. 2. 33 pp.

Insect & Disease Management Division. 1988. Forest & Shade Tree-Insect & Disease Conditions for Maine. 9 issues from May 6 through September 2. Edited by R.G. Dearborn.

Ostrofsky, W.D., T. Rumpf, D. Struble and R. Bradbury. 1988. Incidence of White Pine Blister Rust in Maine After 70 Years of a Ribes Eradication Program. Plant Disease 72:967-970.

# 1988
# PEST SUMMARY

Pest problems encountered in 1988 were similar to those experienced in 1987 except for slight variations in intensity and distribution. The traditional "big" problems of the past were replaced by a few "new" ones and by problems related to environmental concerns. While coverage of insect problems increased in 1988 through more efficient use of the Forest Insect & Disease Survey (FIDS) system, the loss of our forest pathologist for much of the season was reflected in less information on tree diseases, especially new ones or those of limited extent.

Although a number of serious softwood insect problems were evaluated during the 1988 season, those affecting hardwoods drew much of the attention. Populations of the "traditional" major insect pests, spruce budworm and gypsy moth, continued to slide to new lows this season while spruce beetle and the late season hardwood defoliator complex rose strikingly. Others such as; the feeders on aspen and balsam poplar, birch leafminer, eastern larch bark beetle, pine leaf adelgid and white pine weevil remained fairly static at 1987 levels. Damage from the more common Christmas tree and plantation pests rose in many cases but generally remained spotty. A few surprises were experienced with the appearance of high populations the spear-marked black moth and its larval defoliation on white birch in northern Maine, and the heavy maple leafroller defoliation of red maple in eastern Maine. As a result of fairly intense interest in pear thrips and hemlock woolly adelgid, surveys for these pests were conducted. Only scattered individual thrips were found but no damage was observed. No hemlock woolly adelgids were found.

White pine blister rust (WPBR) again dominated disease activities in 1988 although a number of other disease problems were also addressed. The results of the WPBR study were summarized by Ostrofsky (1988) and the economic evaluation presented by Bradbury (1989). From our surveys it appears that many of the common disease problems such as; balsam fir needle rusts, European larch canker, hardwood foliage problems, many of the softwood needlecast diseases, sirococcus shoot blight and scleroderris canker remained fairly stable at low levels during 1988. Annosus and Armillaria root rots remained prevalent and destructive. Disease surveys were not as intensive in 1988 as in 1987, however.

Precipitation during 1988 was better distributed throughout the season than in 1987 but was quite variable in abundance across the State. Although Maine generally fared better than many parts of the country, conditions were still on the dry side. Some of the more drought prone sites did not see enough relief and many trees such as sugar maple, beech and white and yellow birch on ridges and hill tops looked unhealthy. Drought over several years has very likely resulted in some rootlet mortality. If further drought conditions occur in 1989, damage to weakened trees could accelerate.

The I & DM division is involved in several quarantines to which another was added in 1988. Gypsy moth and European larch quarantines were already the responsibility of the MFS-I & DM Div. in cooperation with the USDA-APHIS. To this was added in 1988 a cooperative quarantine effort with the Me. Dept. Agr., Food and Rural Res. against the hemlock woolly adelgid.

As the forests of the State change, it becomes necessary to reevaluate our approach to many of the pests which are encountered. The basic Forest Insect & Disease Survey conducted by the I & DM staff provides information on current developments through periodic conditions reports. Special projects are set up to evaluate the more important problems. While we can propose solutions to some of these problems, it is basically up to land managers themselves to incorporate this information into a management plan which is suitable to their particular situation.

A more detailed summary of the 1988 pest conditions follows:

## (A) Forest Pests - Softwoods
## (See also Sections C & D)

### Insects

**Arborvitae Leafminers (4 species)** - Populations of these leafminers increased generally in 1988 over much of central and eastern Maine and damage was noticeably heavy in some portions of Washington and Hancock Counties and in the Penobscot River valley south of Medway. This upward trend is in its second year and may portend damaging populations in these areas again in 1989. Populations in most other areas remained fairly static at low levels and in some of the areas of coastal eastern Maine heavily ravaged over the past few years, even declined.

While this pest has not generally been considered a forest problem, ornamentals showed noticeable browning from mining in 1988 and damage may be worse in 1989.

**Balsam Fir Pests** - See Section C

**Balsam Fir Sawyer Beetle (*Monochamus marmorator*)** - Balsam fir with only the top portion turned red were fairly common in 1988 due to the activities of the larval, or round-headed borer, stage of this insect. The problem was not serious due to the low numbers of trees involved but did arouse curiosity.

**Balsam Woolly Adelgid (*Adelges piceae*)** - The activities of this species continued to exert serious stress on balsam fir, especially in coastal Washington and Hancock Counties. The "flat-topped" characteristic of gout infested fir was common in many stands. The gout phase still predominates although isolated trees in the Rangeley Lakes country showing light infestations of the woolly trunk phase have been reported. Fir in northern Maine seem to remain relatively free of this problem.

**Hemlock Borer (*Melanophila fulvoguttata*)** - Increased populations of the larval, or flat-headed borer, stage of this insect were observed in stands of stressed hemlock and black spruce in 1988. Although larvae may occur by the hundreds or thousands under the bark of infested trees, their presence usually signals a stressed situation. Woodpeckers frequently strip the bark from such trees to feed on the larvae. Healthy trees are not usually threatened to any degree.

**Hemlock Looper (Lambdina fiscellaria)** - This feeder on both softwoods and hardwoods has caused little problem in Maine over the years, unlike that experienced in Canada, but the significance of high moth populations in August of 1988 has aroused attention. The last outbreak of hemlock looper reported from Maine was a small one in 1966 which stripped and killed 10 acres of mature hemlock in Nobleboro. Prior to that time we have only one other record involving 100 acres of "old growth" hemlock which was stripped and killed "near Bath" in 1927.

In 1988, hemlock looper larvae were more common than usual throughout the State and moths were noticeable in many stands in August. The most curious event was the large catches of moths found in both spruce budworm and gypsy moth pheromone traps. We will be watching this one in 1989.

**Hemlock Woolly Adelgid (Adelges tsugae)** - This insect has not yet been found in Maine even though surveys have been conducted to try and detect its presence. Maine's hemlock resource could be jeopardized should this pest be allowed to enter the State.

The Maine Forest Service and the Maine Department of Agriculture, Food and Rural Resources have established a quarantine on the importation of hemlock logs, products and nursery stock from infested areas. Hopefully, this action will restrict or retard the spread of this adelgid into the State. We also hope that Maine's cold winters will be a further barrier against the advance of the adelgid.

Hemlock in southern Maine, especially in urban areas, which looks stressed and/or has small woolly insects on the underside of the foliage should be reported to the I & DM Division or the State Horticulturist.

For more information on the hemlock woolly adelgid and the quarantines imposed to limit its spread, contact the State Horticulturist, Me. Dept. Agr., Food and Rural Res., State House Sta. 28, Augusta, Me. 04333 (Phone (207) 289-3891) or the State Entomologist, I & DM Div., Me. For. Serv., State House Sta. 22, Augusta, Me. 04333 (Phone (207) 289-2791).

Similar quarantines have also been imposed by New Hampshire and Vermont.

**Larch Casebearer (Coleophora laricella)** - Populations of the larch casebearer continued their decline for the third successive year. Only isolated spot infestations and very light populations elsewhere were reported.

**Larch Decline/Bark Beetle (Dendroctonus simplex)** - Since 1987, increasing concern has been expressed over what appears to be a growing incidence of larch mortality. Although a number of organisms such as Armillaria mellea and Dendroctonus simplex, have been associated with the problem, the eastern larch beetle, D. simplex, seems to be the most consistent.

Other stress factors such as low moisture levels undoubtedly have a role as well. This mortality may occur as isolated trees or encompass entire stands.

An aerial survey of coastal Maine from the New Brunswick border west to Lincoln County was conducted in 1988. The area surveyed contains approximately 83% of the State's coastal larch type; an estimated 6% of the larch stands were evaluated. Of the 216 stands evaluated, 38% were judged to have no damage, 33% had dead individual trees, 15% had dead patches of trees and 14% of the stands had 10% or more dead stems most likely from larch beetle attack.

Based on data from six trend monitoring plots, mortality is increasing in or near old infestations which is not surprising where bark beetles are involved. Observations from the field are varied and indicate that mortality in some stands is stabilizing while in others it is just getting started. Although the problem seems worse in southern Maine, new stands of dead and dying larch have also been reported from Aroostook and southern Somerset Counties.

This is a very serious problem in Maine, especially in view of plans to establish extensive plantings of larch statewide. The I & DM Div. will continue to monitor established plots and expand an additional network of plots statewide to monitor infestations on a multi-year rotation. Data from the plots will be supplemented by information obtained through more general pest surveys (FIDS) of larch plantations to provide a better view of larch health in Maine.

**Larch Sawfly** - See Section C

**Pine Fascicle Mite (Trisetacus alborum)** - Flagging of white pine due to the presence of this pest was very spotty and light in most areas in 1988. Although the problem seemed to be down from 1987 levels, it was often difficult to evaluate due to increased populations of a twig boring bark beetle (? Pityophthorus ramiperda) and heavy damage from the pine leaf adelgid.

**Pine Leaf Adelgid (Pineus pinifoliae)** - Damage to white pine was locally severe in late 1987 and became more evident early in 1988 across central and eastern Maine. Damage was heaviest in areas with concentrations of the alternate hosts, red and black spruce. Infested pine in many of these areas were severely browned and are now under stress from this attack. Another attack this season could kill some of the smaller (under 30 ft.) trees. Galls should form on the spruce hosts as buds develop this spring and any potential for damage to pine should then be evident. Migration to pine occurs after these galls open in mid to late June.

**Spruce Beetle (Dendroctonus rufipennis)** - The spread of spruce beetle through budworm damaged stands containing older white spruce became more evident as numerous new areas began to show up in 1988. Activity has now been confirmed over more than 5,000 acres in northern Maine and scattered infested trees are found throughout as surveys continue.

In many of the infested stands investigated, 75% or more of the large (15" DBH) white spruce have been killed. White spruce volumes in these stands range from 10 to 60% of the stand content. While some stands have been considered unsalvageable by the landowners, many others are being salvaged. Variations in the incidence of degrade organisms such as Monochamus or rot fungi and destined use of the timber may affect salvageability differently in different stands.

New survey methods are being developed to evaluate the significance of this problem statewide and to individual landowners. Efforts will be made to try and determine how to risk rate stands for initial colonization and rate of spread within infested stands.

Meetings and training sessions for foresters and other interested groups have been offered to familiarize field people with the problem.

**Spruce Budmoth** - See Section C

**Spruce Budworm (Choristoneura fumiferana)** - The spruce budworm infestation in Maine remained at a very low level in 1988. The I & DM staff looked for areas of budworm activity throughout the State as part of the normal Forest Insect Survey. As in 1987, the only populations found were in the Southeast (Hancock and Washington Counties). Aerial surveys conducted in July confirmed the larval findings. A total of approximately 65,000 acres of defoliation were recorded in 1988 (Figure 1). Within this area there was an estimated 55,000 acres of moderate to severe defoliation and an additional 10,000 acres of light damage. Damage was extremely spotty within the area mapped.

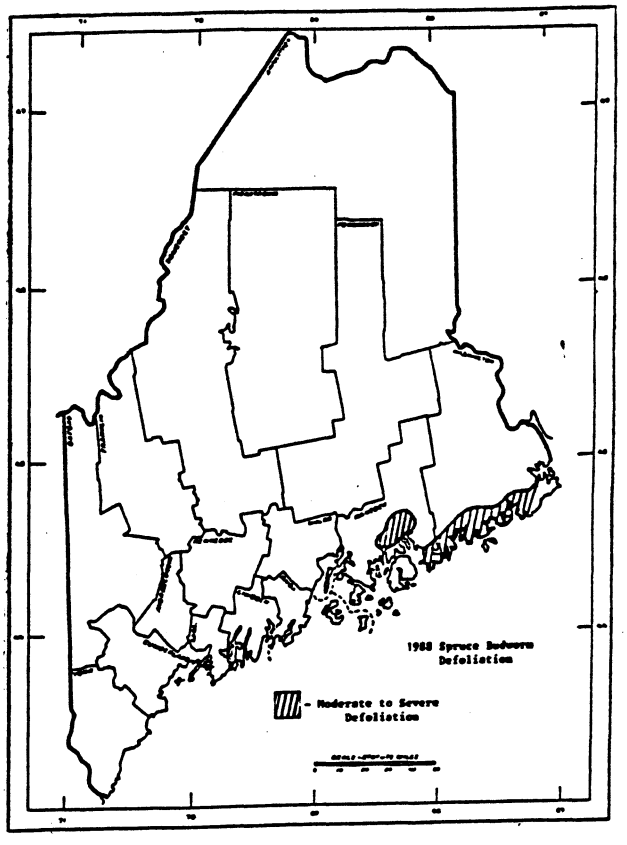


**Figure 1**

A survey of adults utilizing pheromone traps, at 250 locations, was conducted throughout the spruce-fir region of the State. No moths were caught in the North, West, or Central portions of the survey area. Many traps in Hancock and Washington Counties caught moths, but counts were very low with a maximum of 45 moths occurring in one trap from Harrington. Most catches were much lower. There is some concern as to the effectiveness of this survey because only low numbers of moths were caught even in heavily defoliated areas, even though moth activity was observed near the traps. It was of interest that hemlock looper moths were caught in noticeable numbers in many of these traps.

A series of 20 light traps, which were operated in 1988 for the 45th season, yielded the lowest numbers of spruce budworm moths since 1967. A total of 209 moths were caught of which 180 were from one trap at Meddybemps (Washington County). Only five other traps, all in southern Maine, yielded moths. The light trap survey, which provides distribution and abundance figures for the adults (moths) of a number of forest pests, may be expanded in 1989. Trend figures developed from catches are often useful in forest management decisions.

Scattered spruce mortality continues to occur in heavily defoliated portions of Hancock and Washington Counties. Losses directly attributable to budworm defoliation have ceased in Northern, Western, and Central Maine, however, losses due to secondary or associated factors such as spruce beetle and Stillwell's Syndrome continue.

Based on 1988 defoliation, and light trap and pheromone trap catches, low populations are predicted again in 1989. Defoliation in 1989 should be confined to the southeast and should be of similar magnitude to that of 1988. A significant reduction in area or intensity would not be surprising in view of the steady decline of budworm in Maine.

**Spruce Coneworm (Dioryctria reniculelloides)** - Coneworm populations continued a downward slide, parallelling those of the spruce budworm. Populations were barely detectable in most areas again in 1988 and are expected to remain low in the near future.

**Stillwell's Syndrome** - See disease section following.

**White Pine Weevil** - See Section C

## (A) Forest Pests - Softwoods (See Sections C & D)

### Diseases

**Annosus Root Rot** - See Section C

**Armillaria Root Rot (Armillaria mellea)** - This disease appears as a contributing factor in nearly every forest tree decline complex and in association with the decline of many other stressed trees. Trees infested with spruce beetle and eastern larch beetle often, if not always show the presence of Armillaria. Balsam fir exhibiting Stillwell's syndrome all appear to be infected with this fungus as well. Sugar maple suffering from drought stress and other problems are also frequently infected.

While older trees seem to exhibit more striking and readily visible symptoms more serious losses occur in young, recently planted trees in plantation or specimen tree situations. Newly planted trees and specimen trees under stress from planting shock, drought or other factors seem to be suffering increasingly higher losses in recent years due to Armillaria

root rot. Such potential losses should be addressed in any planting program. Through adjustments in site selection and preparation, planting time and methods, and/or post-planting care, it may be possible to minimize losses due to this disease in young stock.

**Balsam Fir Needle Rusts** - See Section C

**Eastern Dwarf Mistletoe (Arceuthobium pusillum)** - Although concern continues to run high in some areas over the impact of this parasitic plant on coastal white spruce, few new developments arose in 1988. We have not reassessed the situations on Squirrel and Monhegan Islands since those islands' associations took action on Maine Forest Service recommendations.

**European Larch Canker (Lachnellula willkommii)** - Surveys for this disease in 1988 yielded no new areas of infestation and the 1985 quarantine boundary remains unchanged (See Figure 2). In the two epicenters in Cutler-Jonesboro and Friendship, the infection rate is heavy (many trees with stem cankers and more than one canker per branch). The infection rate in other infested areas runs light to moderate (only occasional cankers on branches and generally no stem cankers).

We anticipate that this disease may eventually spread between the two present quarantine areas if it has not already done so. Surveys in coastal areas will continue so that new areas can be detected early.

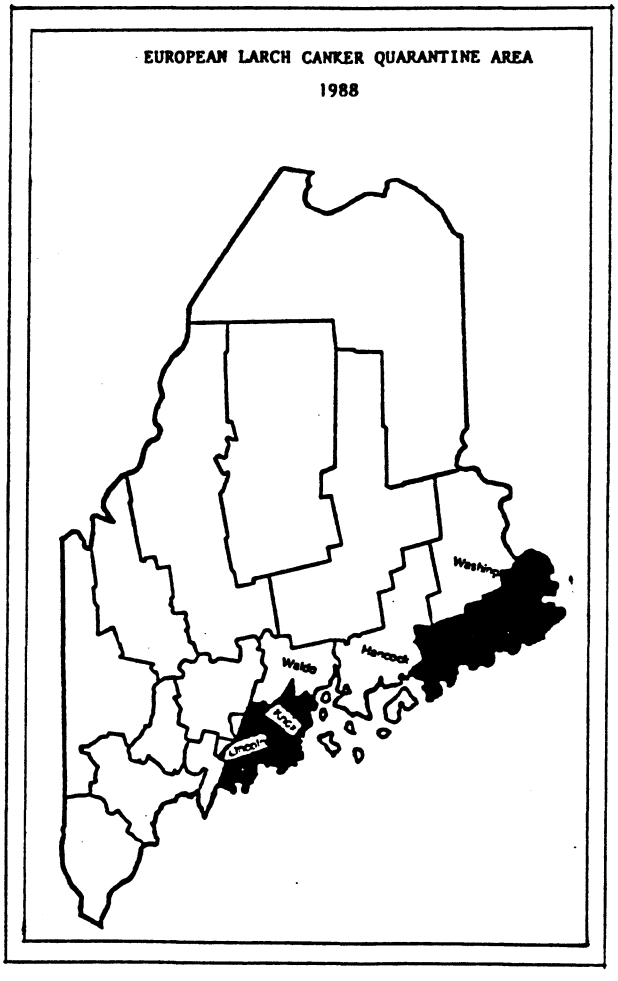


**Figure 2**

**Hemlock Mortality** - Many roadside hemlock in some areas of eastern Maine died in 1988 from what appeared to be a combination of factors ranging from drought to roadside herbicide treatments. No definite single cause was determined.

**Pinewood Nematode (Bursaphelenchus xylophilus)** - Surveys in 1988 confirmed pinewood nematode in Maine for the first time from balsam fir, and from two new locations. Since this pest was first confirmed from Maine in 1986, it has been found in white pine from Baldwin, Casco, Whitefield and Albion in southern Maine and now from balsam fir in northern Maine at Medway and T11 R17 WELS. Surveys will continue in 1989 on new hosts and new locations, as time permits.

**Scleroderris Canker** - See Section C

**Sirococcus Shoot Blight** - See Section C

**Stillwell's Syndrome (Associated with Armillaria mellea)** - More "red fir" characteristic of this disorder were observed in 1988 than in 1987 but the incidence appeared to be lower than 1984-86 levels. Affected trees were scattered throughout the spruce-fir type, especially in areas heavily defoliated by the spruce budworm in the past. This disorder should not be confused with "red-topped" fir which is caused by larvae of the **balsam fir sawyer beetle** (Monochamus marmorator).

Stillwell's syndrome is expected to continue taking out balsam fir at a low but variable rate in old budworm ravaged or otherwise stressed stands. Losses at their worst usually average less than 1% of the balsam fir in any one stand in any one year.

**White Pine Blister Rust (Cronartium ribicola)** - This disease continues to be one of the major problems limiting the successful management of white pine in Maine. In 1988, control efforts by the MFS were carried out to protect 32,221 acres of commercially valuable white pine.

Studies were conducted in 1987 and 1988 to determine the efficiency of the state's white pine blister rust (WPBR) control effort. These studies confirm that blister rust control through Ribes eradication procedures is both biologically effective (Ostrofsky et al. 1988) and cost efficient (Bradbury 1989). As a result of this research, the Maine Forest Service (MFS) plans to continue and develop its white pine blister rust control program. The I&DM Division will continue to explore the potential for further modifications and improvements in the program and possible expansion in northern Maine.

Interest has been expressed recently in permitting the culture of disease resistant currants and gooseberries for commercial purposes. The MFS opposes relaxation of present regulations which prohibit such activity. There are serious concerns regarding whether resistant stains really are immune and, if so, whether this immunity is likely to extend to seedling progeny which may escape to infest local pine growing areas. More research is needed before any restrictions are lifted to avoid adding to the WPBR problem.

**White Pine Needle Blight (SNB)** - Symptoms of SNB were not as striking in 1988 as they had been in 1987 although there were areas where it was heavy enough to be noticeable (light-moderate).

## (B) Forest Pests - Hardwoods

### Insects

**Aspen Feeders (Miscellaneous)** - Aspen throughout northern and eastern Maine looked rather sparse again in 1988 from feeding by a variety of pests. The **serpentine leafminer** (Phyllocnistis populiella), **obliquebanded leafroller** (Choristoneura rosaceana), several other **leafrollers** (esp. Anacampsis innocuella and Pseudosciaphila duplex) and an unidentified

**flea beetle** (Altica sp.) seemed to head the list of early season pests. The **spiny-elm caterpillar** (Nymphalis antiopa), **cleft-headed spanworm** (Biston betularia cognataria), **goat sallow caterpillar** (Homoglaea hircina) and a **leaf folding sawfly** (? Phyllocolpa sp.) were also more frequently collected or observed in 1988.

**Balsam Poplar Defoliators** - In 1988, balsam poplar in Maine suffered severe defoliation throughout the season from a number of pests. Heaviest damage was in northern, western and central portions of the State but noticeable damage was also reported from eastern Maine. Defoliation from one or more pests exceeded 50% in nearly every stand and locally exceeded 90%.

The most extensive problem involved high populations of an **undescribed leafminer** (? Lyonetia sp.) which caused moderate to severe defoliation of balsam poplar in Aroostook County for the third consecutive year. Balsam poplar, both as a component of mixed stands and as large residual trees in heavy cuts, were literally turned red in late June and in July by the leafmining activities. The area involved was roughly analogous to that of 1987 (T12 R11, T13 R11 and T14 R10). Populations appear to have stabilized somewhat at 1987 levels indicating that a drop could begin as early as 1989.

A greater number of other species of insects appeared to be present in the 1988 complex such as: **Another leafminer** (? Phyllonorycter sp.), **leaf beetles** (several spp.), **flea beetles** (Altica sp.) and a **solitary leaf tier** (Nycteola cinereana). These associated species appeared to be more widespread across central Maine from the Rangeley lakes region through Millinocket to Topsfield.

**Beech Scale (Cryptococcus fagisuga)** - Populations of the woolly scale and the presence of the red perithecia (fruiting structures of the associated, Nectria coccinea) on beech bark did not seem to be as highly visible in 1988 as in past years. Trees exhibiting past or present damage still predominate in most of the stands which are investigated. Interest is still being expressed in exploring the possibilities of managing some stands for resistance.

**Birch Casebearer (Coleophora serratella)** - Populations of the birch casebearer remained stable and endemic over most of the State in 1988 except for local hot spots in west central Aroostook County and in the Rangeley Lakes area.

**Birch Lacebug (Corythuca sp.)** - Pockets of white and yellow birch with noticeably yellowed and mottled foliage showing brown flecks and lacebugs on the lower leaf surface were common throughout much of northern Maine in 1988. This problem was much more pronounced than it has been in recent years.

**Birch Leaf Folders (Primarily two species)** - Folded and tied leaves of birch seemed to be a common sight over much of the northern two thirds of the State this season. The first "culprit" to appear was the **spear-marked black moth** (Rheumaptera hastata), larvae of which folded the leaves of white birch into a pocket in which to live and feed. Infested leaves were skeletonized by the black, looper-type larva which has a row of

lighter spots on each side. Folded leaves contain a pocket of frass (waste material) which is characteristic for this species. Damage was heaviest in northern and north central Maine and larvae were active in decreasing number through August. The black, white-marked butterfly-like geometrid moths were common in open areas on warm days in early June. This is the first time this species has been seen in such numbers in Maine.

Foliage of many yellow birch in the Rangeley Lakes areas was noticeably thin in August due to leaf folding by larvae of what appeared to be the **blackheaded birch leaffolder** (Acleris logiana). The problem was observed to a much lesser degree locally across central Maine.

**Birch Leafminer (Primarily Messa nana)** - Moderate to high populations of birch leafminer were evident on white birch throughout much of south central Maine in 1988. Levels of damage were similar although more widespread than in 1987, especially west of the Penobscot River. Populations of species other than Messa nana were still relatively low in 1988. Messa populations may drop in 1989.

**Birch Problems (Various)** - Aside from drought, casebearer, lacebugs, leaffolders, leafminers and sawflies; birch seemed to be affected by a number of other insect pests as well in 1988. **Birch tubemaker** (Acrobasis betulella) was locally heavy and the tight, hard, bullet shaped larval cells of black frass could be found in July within tangled webs of leaves on trees throughout southern Maine. **White marked tussock moth** (Orgyia leucostigma) caterpillars were also locally common on white birch in central Maine. The **mottled, or birch, stink bug** (Meadorus lateralis) was also locally abundant especially on catkins causing minor feeding injury.

**Birch Sawfly (Arge pectoralis)** - This species became much more destructive in 1988 as larvae stripped birch in July and August across much of central Maine. Damage was associated with the widespread hardwood defoliation (See Figure 3) and appeared to be the worst on record for Maine. In some cases larvae of the sawfly ran out of food before they reached full size and cocoons were smaller than usual.

This was the second consecutive year of such high and destructive populations of this species.

Another species, Arge clavicornis, also occurred on birch but in very low numbers and caused little, if any, damage.

**Cankerworms and Loopers** - The spring feeders; **Bruce spanworm** (Operophtera bruceata), **spring cankerworm** (Paleacrita vernata) and **fall cankerworm** (Alsophila pometaria) were again very low in numbers in 1988 with no defoliation detected. Populations of these insects are expected to remain low again in 1989 except for possible hot spots. Populations of the **cleft-headed spanworm** (Biston betularia cognataria) and the hemlock looper, however, were higher although no defoliation by these species was evident.

**Fall Webworm (Hyphantria cunea)** - Activities of the larvae of this species were more noticeable in 1988 than in 1987. Unsightly webs festooned branches of infested and stripped trees especially in southern Maine in July and August. Scattered reports of moderately heavy infestations were received from as far north as Grindstone, T1 R7. Populations seemed to be more concentrated into pockets or on individual trees and less general than they have been for several years.

**Forest Tent Caterpillar (Malacosoma disstria)** - No known areas of defoliation by this species were reported in 1988 and larvae appeared to occur only as scattered individuals. Numbers of adult moths as recorded in our annual light trap survey went up noticeably, however, in 16 out of 20 traps. This would indicate the possibility that populations may be on the rise overall. Although this species will be monitored more closely in 1989, it may take another field season before any trend can be confirmed.

**Greenstriped Mapleworm (Dryocampa rubicunda)** - Populations of this species remained extremely low in 1988 with no noticeable defoliation reported.

The highest populations of this species still appear to be around the south side of Baxter State Park in T2 R9 WELS where larvae could be found in light to moderate numbers in early August. A population has existed in this area since 1984 to varying degrees.

**Gypsy Moth (Lymantria dispar)** - Gypsy moth populations continued to decline in 1988, at least in infested areas of eastern Maine. Only 100 acres of moderate defoliation in T10 SD was mapped, down from a statewide total of 849 acres in 1987.

The only known new infestations were the one in T10 SD - Cherryfield and another in New Gloucester in southwestern Maine. In eastern Washington County only endemic populations remain. Populations in other areas of southern Maine appear to be increasing, but were at low levels in 1988.

**Hardwood Defoliators (Late season complex)** - A complex of late season defoliators again assaulted the hardwood forests across central Maine. Most of the damage was due to feeding by; the Variable Oakleaf Caterpillar (Lochmaeus manteo) on beech, Orangehumped Mapleworm (Symmerista leucitys) on sugar maple and Birch Sawfly (Arge pectoralis) on birches. However, a total of more than 25 different insect species feeding on birches (white, gray and yellow), sugar maple and beech were involved to a noticeable degree (See Table 1).

**Table 1**
**Hardwood Defoliator Complex 1988**

**Significant Numbers (i.e., noticeably present and destructive in most areas checked)**

*Birch Sawfly, Arge pectoralis
*Orangehumped mapleworm, Symmerista leucitys
*Spearmarked Black, Rheumaptera hastata, birch only
*Variable Oakleaf Caterpillar, Lochmaeus manteo

**Noticeable Throughout (i.e., almost always present in low but detectable numbers)**

American Dagger Moth, Acronicta americana
*Blackheaded Birch Leaf Folder, ? Acleris logiana
*Cleft-headed Spanworm, Biston betularia cognataria
Flat Leaftiers, Psilocorsis spp.
Lacecapped Caterpillar, Oligocentria lignicolor
Spotted Tussock, Lophocampa maculata
Unicorn Caterpillar, Schizura ipomoeae
Unicorn Caterpillar, S. unicornis
Yellowlined Caterpillar, Nadata gibbosa

**Scattered and Infrequent (But with multiple records)**

Birch Sawfly, Dimorphopteryx sp.
Dagger Moth, Acronicta spp.
Hickory Tussock, Lophocampa caryae
Luna Moth, Actias luna
Pale Tussock, Halysidota tessellaris
Polyphemus moth, Antheraea polyphemus
Prominent, Heterocampa biundata
Prominent, Het. umbrata
Redhumped Oakworm, Symmerista canicosta
Slug Moth Caterpillars
Sphinx Moths, Paonias spp. and Smerinthus sp.
Webworms, Tetralopha spp.
Yellownecked Caterpillar, Datana ministra
Zebra-marked Caterpillar, ? Acronicta retardata, Maple only

*Discussed elsewhere in this report.

Defoliation was much more severe in 1988 than at any time on record for Maine. Larval activities began in late July or early August (dependent on species) and continued until leaf drop in early October. Approximately 122,332 acres of moderate to heavy (75-100%) defoliation were aerially mapped with approximately 50,000 additional acres reported or observed in west central Maine. Light defoliation was detected over a wide area (See Figure 3).

Populations were up strikingly in 1988 from 1987 levels and appeared healthy going into the winter.

Trees suffering from drought and/or defoliation may have high fine rootlet mortality which may result in compensation in the crown in the form of various degrees of dieback.

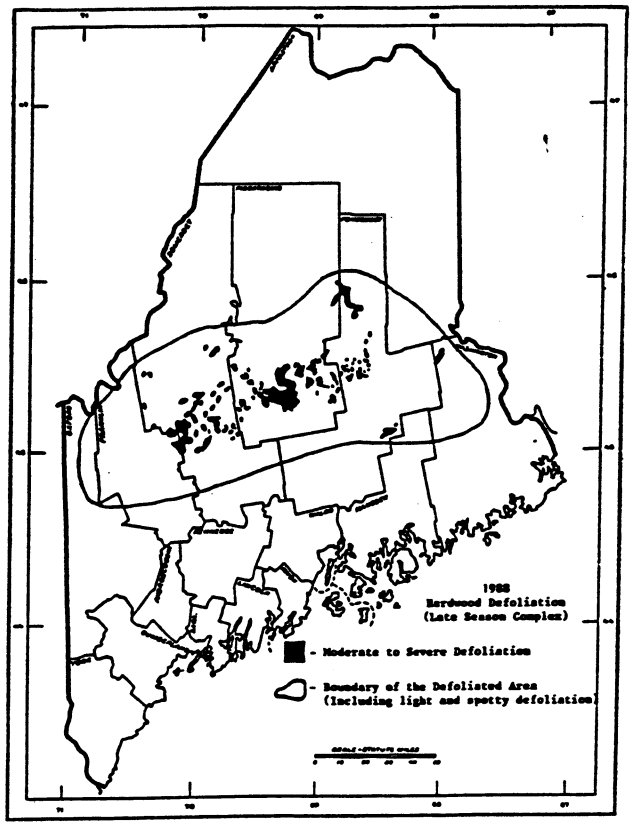


**Figure 3**

**Maple Leaf Miner (? Species)** - A blotch miner of maple was observed in many areas this past season. Populations appeared to be low and activity was not noticed until early August.

**Maple Leaf Roller (Sparganothis ? acerivorana)** - An area of moderate to heavy defoliation of red maple in June covering 17,670 acres in southern Hancock County near Ellsworth was apparently caused by this species. Infested trees were thin throughout and refoliation was poor.

This species causes spotty defoliation in many years and populations show striking ups and downs but this was the first time such heavy defoliation has occurred over as large an area. No significant defoliation had been noted in the area in 1987 and it is not known where the population will go in 1989.

**Maple Webworm (Tetralopha asperatella)** - The leafy "nests" of this species were again visible on maple branch tips in August of 1988. Populations were similar to those seen in 1987. Nests were also seen on oak and beech which were apparently also caused by this species.

**Oak Leaffolder (Ancylis burgessiana)** - Folded and webbed red oak leaves containing larvae of this species were again evident in southern Maine although not as abundant in 1988 as in 1987. No defoliation was reported.

**Oak Leafroller (? Archips semiferanus)** - Rolled leaves containing larvae of what appeared to be this species caused local thinning of foliage in 1988. Damage was very light overall, however. Several reports of activity of an interesting leafrolling weevil (Attelabus bipustulatus) were also received from scattered red oak areas in southern Maine. The tiny, tight, cylindrical pellets formed from the rolled leaves and containing eggs or larvae of this beetle were more of a curiosity than destructive.

**Oak Lecanium Scale (Species not known)** - Red, white and pin oak twigs showed locally heavy infestations of these small, brown, hemispherical scales again this season in southwestern Maine. In central Maine, treehoppers seemed to be more prevalent. Both produce honeydew.

**Oak Leaftier (Shredder) (Croesia semipurpurana)** - Local hot spots of heavy defoliation by the leaftier and associated leaf rollers were reported from oak throughout most of its range in Maine in 1988. Populations still were generally low.

**Oak Skeletonizer (Bucculatrix ainsliella)** - Populations declined slightly in 1988 from 1987 levels and, although it was not difficult to find larvae or pupae, damage was barely detectable in most instances.

**Oak Treehoppers (Several species)** - A number of roadside red oak in Etna showed extremely high populations of treehopper nymphs in early June. Low, but still higher than normal, numbers of treehoppers were also observed on oak in many other stands. **Honey dew** produced by these

insects coated foliage and branches giving them a waxed and sticky appearance. As many as 5 nymphs could be found nestled head-in around individual bud clusters. At least two species in two separate genera were involved.

**Oak Twig Pruner (Elaphidionoides villosus)** - Populations of the twig pruner remained fairly stable at low levels for the third consecutive year. Damage to individual trees, however, was occasionally heavy.

**Obliquebanded Leafroller (Choristoneura rosaceana)** - This versatile feeder on a wide variety of deciduous hosts was relatively abundant again in 1988. Defoliation was negligible even though it was recorded from aspen, birch, beech, balsam poplar and maple in the course of FIDS surveys.

**Orangehumped Mapleworm (Symmerista leucitys)** - Populations of this and associated species of hardwood defoliators were higher over a much wider area (See Fig. 3) in 1988 than in 1987 and defoliation levels from larval feeding were much worse. The orangehumped mapleworm again favored sugar maple and beech but also occurred in low numbers on a number of other deciduous tree hosts. Larvae were again found into early October in some areas. No estimate could be made of potential 1989 levels. (See also section on hardwood defoliators).

**Oystershell Scale (Lepidosaphes ulmi)** - This pest is still with us in beech stands across central and eastern Maine although populations seem to be subsiding overall and fresh damage is not as evident. Heavy populations have been reported locally in Millinocket and East Millinocket with small "pockets" elsewhere.

Past damage is noticeable on more than 100 townships across the central band of the State. Over 5,000 acres of beech stands showing previously heavy to severe damage (overstory branch/top dieback and understory mortality) are apparently starting to recover.

**Pear Thrips (Taeniothrips inconsequens)** - Heavy damage to sugar maple stands west of Maine have prompted concern over the potential threat to our already beleaguered resource. In spite of spring surveys over the past three years only scattered individual thrips have been found and no damage definitely attributable to this insect has been observed. Surveys will be intensified in western Maine in 1989 as the threat from this pest moves closer.

**Saddled Prominent (Heterocampa guttivitta)** - Only scattered individual larvae of this and related species of Heterocampa were reported in 1988 and no defoliation observed.

**Satin Moth (Leucoma salicis)** - Scattered pockets of satin moth defoliation of woodland aspen were reported across central Maine in 1988 for the first time in a number of years. Populations and defoliation in these areas were light and limited to only a few trees each.

**Spiny-elm Caterpillar (Nymphalis antiopa)** - Several spot infestations (limited to several trees each) of this species on willow and poplar in Aroostook County and in T4 R11 were reported in 1988. Levels were much the same as in 1987.

**Tussocks and Dagger Moths** - See Hardwood Defoliators

**Variable Oakleaf Caterpillar (Lochmaeus manteo)** - This species was again a major component in the late season hardwood defoliator complex. As with the Orangehumped mapleworm, increases in numbers occurred primarily in new areas resulting in more widespread defoliation (See Fig. 3). Populations remained high in areas stripped in 1987 as well and there was little evidence of parasitism, predation or disease in most areas checked.

Although beech seemed to be the preferred host for this species, larvae fed also on sugar maple and to a lesser extent on various other deciduous trees. Prepupae were very common in soil cells beneath infested trees in October and November and appeared to be healthy going into winter.

## (B) Forest Pests - Hardwoods

### Diseases

**American Chestnut and Chestnut Blight (Endothia parasitica)** - Interest in potentially resistant American chestnut is still running high and although the primary mover in Maine, Doug Stark, has retired, he still has an interest in the program which he started years ago. No new developments were reported in 1988 and we still receive positive reports from those who planted out some of Doug's chestnut trees.

**Armillaria Root Rot (Armillaria mellea)** - Reports of infection of hardwood by this fungus were not as numerous in 1987 except for older stressed sugar maple.

**Ash Anthracnose (Gloeosporium aridum)** - Leaves of ash with brown and distorted areas caused by this fungus were fairly obvious in some areas this past season although infection levels overall were down.

**Ash Leaf and Twig Rust (Puccinia sparganioides)** - Very few reports of this disease were received in 1988 and levels appeared to be very low.

**Beech Bark Disease** - See Beech Scale (preceding section).

**Birch Dieback/Decline** - Dieback of white birch following heavy birch casebearer defoliation in the mid 1980's seems to have stabilized. This trend is somewhat masked by increased twig mortality thought to be caused by recent climatic factors such as drought.

Increased top dieback and tree mortality were noted in the old infestations, and mill owners have reported increased degrade from these areas. Conditions were very similar to the birch dieback experienced during the late 1930's although not as severe. There are undoubtedly many factors involved such as casebearer defoliation, bronze birch borer (Agrilus anxius), armillaria root rot, drought, etc. (See drought and hardwood decline sections).

**Cherry Flagging (Caused by ? Leucostoma sp.)** - Scattered dead shoots were very evident on pin cherry in southern Kennebec County in mid-June.

**Drought** - Although precipitation levels for 1988 did not appear to be down significantly from the average, much of the total fell in downpours and when the ground was still frozen or late in the season (August) after most of the growing season was over. Available soil moisture was low at critical times and drought-like conditions still prevailed in 1988 especially on drought-prone sites. Hardwoods, but especially sugar maple, birch (See birch dieback - this section), and beech, seemed to be hardest hit and the foliage of many trees remained distorted and off color throughout the season. This damage was often attributed to such pests as the pear thrips but no such association was found in areas checked. A late season hardwood defoliator complex added to the symptoms in August and September.

Some of the symptoms observed in 1988 which were thought to be drought related were:

1) Smaller and/or sparser foliage
2) Greater susceptibility to opportunistic or weak pathogens resulting in some mortality of twigs, branches and roots
3) Early leaf drop
4) Discolored foliage - yellowed or mottled
5) Mortality of large portions of the tree or the whole tree itself. This has been the least common symptom so far

**Dutch Elm Diseases (Ophiostoma = Ceratocystis ulmi)** - Flagging and dieback of residual elms caused by this fungus disease was widespread and evident again in 1988. It is amazing that we have any elms left at all but a few do manage to survive especially those which are isolated in farm hedgerows.

**Hardwood Decline** - There is a public perception that forests in eastern North America are suffering increased decline and mortality levels, and that growth rates and general health are reduced from previous levels. Previous studies have reported various patterns which have been ascribed to a number of causes. Many of these studies dealt with specific scenarios and were not representative samples of the overall forest condition.

During 1987, the Maine Forest Service entered into a cooperative project with the U.S. Forest Service to evaluate hardwood crown condition in western Maine. The primary aim of this study was to determine the current levels of crown dieback/decline and tree mortality in hardwood stands in Oxford, Franklin and Somerset Counties. The results will provide a scientific basis for any future discussion of forest productivity, and will serve as an accurate base for any future studies of trends.

Although all data from the aerial and ground portions of the survey have been collected and collated, they are still being entered into the computer for analysis. Preliminary observation indicates that, while more damage was discernible from the ground than from the photos, the relative amounts of damage correspond well between the various aerially assigned categories and the on-ground situations. During the winter 1988-89 photo interpretation and ground truth results will be analyzed and compared to determine actual levels of crown damage.

To date no known areas of unexplained hardwood dieback/mortality of appreciable size have been reported from Maine. Much of the mortality in Maine hardwood forests can be attributed to natural causes such as over maturity, drought stress (discussed elsewhere), insect activities (See birch dieback) and disease. Mortality of sugar maple may be hastened by overtapping especially in dry years. Dieback of hardwood forests is not a new phenomenon, it has been experienced before. Any interpretation of the results of this study, which attempts to assign ultimate causes will be difficult at best.

**Poplar Ink Spot (Ciborinia whetzelii)** - The incidence of this common foliage problem of poplar declined again in 1988 for the second year although it was not difficult to find scattered infected foliage in most stands.

**Poplar Thin Foliage (No cause determined)** - Thin foliage was again evident on both trembling and big tooth aspen but no cause was evident in many cases. Shoot blight (Venturia tremulae), late frost and leaf folding sawfly could be implicated in somewhat less than 50% of the stands checked.

**Sugar Maple Flagging** - See Section D

## (C) Plantation, Regeneration, Nursery and Christmas Tree Pests Conifers Only - (See also Section A)

### Insects

**Aphids** - Aphid populations appeared to be down somewhat in 1988 from 1987 levels. Species of Cinara or related species appeared to be the more commonly encountered aphids in 1988, and although high populations were reported, these were usually on scattered or isolated trees.

**Balsam Gall Midge (Paradiplosis tumifex)** - Population levels of this gall midge rose throughout much of the State again in 1988. High populations and some damage to Christmas tree plantations was reported in scattered localities. Populations are expected to continue up in 1989 necessitating control projects within some Christmas tree plantations.

**Balsam Shootboring Sawfly (Pleroneura brunneicornis)** - Blunted and browned (resembling late frost injury) fir tips infested with larvae of this species were very common in some areas in 1988. None of the controls presently used in Christmas tree plantations appear to be consistently effective against this possible pest of balsam fir.

**Balsam Twig Aphid (Mindarus abietinus)** - Population levels of this aphid have continued to rise since 1985 and substantial losses have been experienced by Christmas tree growers in scattered localities within the past two years. Due to great variation in populations between plantations it is necessary to evaluate each one for the need for control. Over 200 acres were treated for this pest in 1988 and more may require treatment in 1989.

**Cooley Spruce Gall Adelgid (Adelges cooleyi)** - Populations of this insect were spotty but locally heavy on Douglas-fir this season. Needles showing characteristic yellow mottling and crooked growth were accompanied by woolly adelgids. Douglas-fir in a number of Christmas tree plantations ranging from Knox in the south to Oakfield in the north showed a stubborn resistance to treatment. In order to successfully raise Douglas-fir for Christmas trees it looks as though Cooley gall adelgid will rank near the needlecast diseases in importance.

**Larch Problems (See also Section A)** - With increased emphasis on larch planting there is a rising concern over the potential impact of a number of pests on this resource. The three major pests of immediate concern are European larch canker, Eastern larch bark beetle and larch sawfly. The bark beetle has been consistently associated with a decline of older larch over the past few years. This decline is being monitored and studied with respect to younger and/or more vigorous stands. Results of these studies are sketchy at this point. Larch sawfly has a potential for serious defoliation but populations have been low for many years and only recently have shown signs of moving upward.

A number of lesser, but locally severe, problems which need to be watched are larch casebearer, tubemakers (several species), aphids (several species) and porcupines.

**Larch Sawfly (Pristiphora erichsonii)** - Although populations of larch sawfly are still extremely low, a very slow but steady increase in frequency of sightings has been observed over the past 2 to 3 years. This trend is expected to continue upward though slowly for probably another year or so. Defoliation was limited to isolated trees in 1988 and more general defoliation is not expected before 1990, if then. Those responsible for larch management should keep an active lookout for this potentially destructive pest, however. Early detection and treatment is the most effective strategy for controlling most sawflies.

**Mites (Several species)** - Mottling of the foliage and webbing resulting from mite activity was common in balsam fir and spruce plantations throughout Maine in 1988. Poor color and vigor reduce the aesthetic quality of many trees and some Christmas tree growers had to treat their plantations to maintain trees of high value.

**Pales Weevil (Hylobius pales)** - No new problem areas associated with this species were reported in 1988 and destructive populations which had been a problem in 1987 appeared to have stabilized.

**Pine Gall Weevil (Podapion gallicola)** - This insect is primarily a problem of red pine in Maine and may cause some very local twig and branch mortality in extreme cases. Even in stands which have had hot spots of heavy gall production, spread of the weevil appears to have been very slow. Several reports of new activity were reported in 1988 in red pine plantations (trees in the 30 feet in height category) in southern Maine.

**Pine Spittle Bug (Aphrophora parallela)** - This insect remained common in 1988 especially on white and Scots pine; however, no areas were known to have required control.

**Saratoga Spittlebug (Aphrophora saratogensis)** - Populations of this species appear to be stabilizing in some areas and no new stands of infested red pine have been reported. The heaviest damage in 1988 was noted on 30 acres of plantation trees in T19 MD and T25 MD (Washington County). Both areas showed varying degrees of mortality and deformity from previous spittlebug feeding. Most new red pine plantings employ at least casual risk rating to avoid highly susceptible sites.

**Seedling Debarking Weevil (Hylobius congener)** - Although this species occurs throughout the State, no damage was reported to us in 1988. In the past, locally heavy damage to transplants was reported from cutover lands in western Aroostook County.

**Spruce Budmoth (Zeiraphera spp. primarily canadensis)** - There were an estimated 1,000+ acres of white spruce with moderate to heavy populations of spruce budmoth in 1988, primarily in eastern and northern Maine. This pest was present in most white spruce plantations checked (See White Spruce Faunistics in this section) and caused severe injury in roughly 20% of these. In a number of the more severe cases, growth loss and bole deformation was evident. It is estimated that several hundred acres of the more severely infested plantations in eastern and northern Maine will require intensive work soon in order to salvage them.

Populations are expected to increase in many plantations with the increase in tree size and number of years on site.

None of the infested areas were treated in 1988 and more work needs to be done to develop an effective control strategy.

Pheromone tests were conducted in 1988 with poor results. Another effort is planned for 1989.

**Spruce Budworm** - See Section A

**White Pine Sawfly (*Neodiprion pinetum*)** - Two reports of isolated defoliation of white pine by this species were received from Greenville and TA R11 in 1988.

**White Pine Weevil (*Pissodes strobi*)** - This is the most serious insect pest of white pine in Maine. It is estimated that more than 25% of plantation white pine throughout the State may show weevilling damage. Although volume loss is thought to be significant, it is loss in grade due to deformation of the stem that is the most serious result. The incidence of this pest has been high nearly every year and is expected to remain so in the years ahead. In addition to white pine, this insect has also been a problem on Scotch and jack pines and Norway and Colorado blue spruce. Infestation of isolated black spruce and red pine has also occurred.

Roughly 1,000 acres were treated by private individuals for this pest in 1988. It is expected that more acreage may be treated in 1989 if chemicals are available. A series of insecticide efficacy trials are planned for 1989 in hopes of making alternative insecticides available.

**White Spruce Faunistic Survey (Plantations)** - Fourteen white spruce plantations were selected for a general FIDS survey in 1988 and sampled from May through August. Most areas of the State were represented except for southern Maine where suitable plantations (5 acres or more of trees 4-12 feet in height) were not found. Table 2 summarizes the results of this general survey.

**Table 2**
**Insects from White Spruce Plantations - 1988**

On Foliage

Found in nearly all plantations checked - Often abundant - Damage evident

Spruce Budmoth, *Zeiraphera canadensis*
Associated Tip Feeders
*Eucordylea* (*Coleotechnites*) sp.
*Zeiraphera* spp.
Orange Spruce Needle Miner, *Coleotechnites piceaella*
Eastern Spruce Gall Aphid, *Adelges abietis*

Found in local hot spots - Damage evident

Spruce Twig Midge, *Mayetiola piceae*
Spruce Bud Scale, *Physokermes piceae*
Aphids, *Cinara* spp.

Found as Scattered Individuals - Damage none to trace

Spruce Gall Adelgid, *Pineus similis*
European Spruce Sawfly, *Gilpinia hercyniae*
Greenheaded Spruce Sawfly, *Pikonema dimmockii*

In Cones - Damage evident - Variable

Fir Coneworm, *Dioryctria abietivorella*
Spruce Seed Moth, *Laspeyresia youngana* (= *Cydia strobilella*!)

Conspicuously absent from the survey were the spruce budworm, **yellowheaded spruce sawfly** (Pikonema alaskensis) and the **European spruce needle miner** (Epinotia nanana) all of which are normal components of the spruce fauna in Maine in most seasons.

The general faunistic approach to sampling regeneration did not provide a high degree of quantitative information but did result in good qualitative information and a formalized system of visitation in this valuable resource. General faunistic surveys will be expanded to include, larch, black spruce and balsam fir as well as white spruce in 1989.

## (C) Plantation, Regeneration, Nursery and Christmas Tree Pests Conifers Only - (See also Section A)

### Diseases & Miscellaneous Problems

**Annosus Root Rot (Heterobasidion annosum = Fomes annosus)** - Only one new infestation of this disease was reported to us in 1988 from Monmouth. Several stands which had been previously infested were chipped completely in 1988. If these areas are replanted to susceptible hosts, the newly planted seedlings may become infected. This disease can be a serious problem in red and white pine plantations in Maine.

**Armillaria Root Rot (Armillaria mellea)** - This disease can cause serious losses in plantations which are poorly planted (i.e., black spruce with a high incidence of "J" root), planted off-site (cold pockets), or in crop conversions (i.e., hardwood sites to Christmas trees). Most losses reported in 1988 were in one of these three categories.

**Atropellis Canker (Atropellis tingens)** - No new reports were added in 1988.

**Balsam Fir Needle Rusts (Uredinopsis mirabilis and others)** - Needle rusts were present on balsam fir Christmas trees in many plantations checked in 1988. Damage seemed more pronounced than in 1987 in these plantations, especially those which were small in size and broken up by brushy areas and wet runs. The marketability of some trees was probably reduced or delayed a year or more. Control of alternate hosts was recommended to several growers.

**Larch Tip Dieback (Cause unknown)** - Scattered red and dead 6-10" tips of native larch were very obvious throughout much of southern Washington and Hancock Counties in mid July. The frequency varied from area to area. The damage was not due to European Larch Canker borers or frost.

**Mechanical Injury** - Christmas tree plantations on rocky sites which are mowed annually, frequently show a high incidence of wounding from rocks thrown out by the mower.

**Needlecast Diseases (Various)** - Needlecast diseases appeared to be generally less destructive in 1988 for the second consecutive year.

**Pine-Pine Gall Rust (Endocronartium harknessii)** - The infestation of Scots pine in T19 MD showed some light branch mortality in 1988 and had increased in intensity since the previous sanitation work. The area was to be biomassed.

**Porcupine Damage** - Larch and jack pine continue to receive heavy damage in some areas from porcupine feeding.

**Scleroderris Canker (Ascocalyx = Gremmeniella abietina)** - This disease appeared to remain fairly stable in 1988 although formal surveys of infested areas were not conducted. There were 5 acres in T19 MD which were sanitized by low branch pruning.

**Sirococcus Shoot Blight (Sirococcus conigenus)** - This incidence of this disease seemed lower in 1988 than in 1987 although no specific surveys were conducted.

**White Pine Blister Rust** - See Section A

## (D) Shade Tree, Ornamental and Miscellaneous Pests

### Insects and Ticks

**Alder Flea Beetle (Altica ambiens alni)** - Populations and damage by this nuisance pest remained at roughly 1987 levels for 1988 in most areas.

**Aphids (Various species)** - Aphids did not generally appear to be as much of a problem in 1988 as in 1987.

**Birch Leaf Miner (Various species)** - Populations of most of the birch leaf miners were down in 1988 on ornamental birch except where Messa nana (See Section B) was a problem. Populations of Fenusa pusilla on gray birch, and Profenusa thomsoni on white birch were at their lowest levels in many years.

**Browntail Moth (Euproctis chrysorrhoea)** - Populations of this pest appear to be increasing and spreading slightly on those Casco Bay Islands previously infested (i.e., Long, Vaill, House and possibly others). Current, noticeably infested areas remain at roughly 40 acres. Moths have been caught in both 1987 and 1988 in a light trap on the mainland at Brunswick indicating a real potential for spread to the mainland.

**Cottony Maple Scale (Pulvinaria innumerabilis)** - Reports of a light to moderate infestation of small (30 feet tall) red maple over roughly two blocks in a residential area of Scarborough was reported in mid June. The scales were fully expanded at that time and somewhat resembled small pieces of popcorn. This insect has not been much of a problem in Maine in the past and generally prefers soft maples, although we have at least one report from white birch as well.

**Eastern Tent Caterpillar (Malacosoma americanum)** - Populations of this nuisance pest in 1988 were at roughly 1986 levels, down from 1987 levels.

**Elm Sawfly (Cimbex americana)** - We received several reports in 1988 of elm sawfly adult and larval activity. The very large conspicuous adults were especially common in alder thickets in late May and early June, apparently feeding on sap from wounds chewed in the bark. The large, naked larvae appeared in July and fed on various deciduous trees and shrubs. They seem to prefer alder, birch, willow and elm. Numbers appeared to be up in 1988 from previous levels. No damage was reported.

**Fall Webworm** - See Section B

**Lyme Disease and its Tick Vector (Ixodes dammini)** - This tick-borne disease which has caused such concern in coastal areas from Massachusetts through the mid Atlantic States, and locally elsewhere, has now been recognized as a potential threat at least in southern Maine. The tick vector appears to be established to varying degrees along the coast east to Mount Desert Island but so far has only been recorded inland for a few miles except for isolated records. The disease acquired in-state has been confirmed in two cases from York and Cumberland Counties although symptomatic cases have been reported from other southern Maine locations. The prevalence and extent of transmission in the State are not currently known. Attempts to define this problem are presently underway through the cooperative efforts of members of the State Working Group on Lyme Disease which includes Maine State governmental personnel (Department of Human Services, Bureau of Health, Department of Inland Fisheries and Wildlife, Department of Agriculture and Department of Conservation), staff members of the Maine Medical Center Department of Research, and a number of community physicians.

**Mountain-ash Sawfly (Pristiphora geniculata)** - This species appears to be on our list of perennial problems affecting ornamental mountain-ash. The 1988 season was no exception with the usual complaints in spite of the fact that control of the problem is fairly easy to achieve.

**Oak Problems** - See Section B

**Oak Galls** - The woolly leaf galls (caused by ? Dryophanta lanata) which we reported in our last Summary Report (No. 2) as being extremely common in 1987 all but disappeared in 1988 and were nearly impossible to find.

**Praying Mantids (Mantis religiosa)** - We have no native praying mantids in Maine but as a result of individual biological control efforts over the years by home gardeners, the **European praying mantis** (M. religiosa) has become established here. Populations seem more successful in some years than others in reaching maturity and 1988 seemed to be a good year. Adults were active earlier than usual and were fairly common at least in Kennebec County. They succeeded in mating and laying eggs which should produce a good crop of young in 1989, weather permitting. They do fly at night in some seasons and have been attracted to light in large numbers on occasion. Colors range from tan, brown or gray to bright green.

**Ticks (Various)** - Ticks have become of more concern in recent years in southwestern Maine, especially early in the season. The **American Dog Tick** (Dermacentor variabilis) is the most frequently encountered species

and is often observed because of its large size. The **Lyme** or **Deer Tick** (Ixodes dammini) and the **Ground hog** or **American Castor Bean Tick** (Ixodes cookei) are smaller but were more frequently encountered in 1988 than in previous years.

**Tussocks and Dagger Moths (Several species)** - The most abundant species in 1988 was the bright yellow and black **spotted tussock** (Lophocampa maculata). The **hickory tussock** (L. caryae) **pale tussock** (Halysidota tessellaris), **American dagger moth** (Acronicta americana) and **alder dagger moth** (A. dactylina) declined in numbers generally in 1988. The number of reports of problems with skin irritation (tussockosis) declined in 1988 for the second consecutive year.

**Uglynest Caterpillar (Archips cerasivoranus)** - Populations of this nuisance species were up in 1988. In some areas of central and eastern Maine, the webs were frequently so numerous that they coalesced into mats covering as much as half an acre.

**Willow Insects** - Defoliation of willow by a variety of insects was reported again this season. The **imported willow leaf beetle** (Plagiodera versicolor) and the **willow flea weevil** (Rhynchaenus rufipes) were the most common but populations seemed to be at roughly 1987 levels. Several **sawflies** and the **spiny-elm caterpillar** (Nymphalis antiopa) were more common than usual but defoliation was very spotty and more prevalent on isolated low willows and aspen in woodland areas of northern and eastern Maine.

## (D) Shade Tree, Ornamental and Miscellaneous Pests

### Diseases and Miscellaneous Problems

**Chestnut Leaf Blotch (? Guignardia aesculi)** - Browned foliage of horse-chestnut (Aesculus hippocastanum) caused by this fungus was more common in 1988 than in 1987. Damage, although aesthetically objectionable, is not generally considered serious. This should not be confused with physiological leaf scorch.

**Dutch Elm Diseases (Ophiostoma = Ceratocystis ulmi)** - Flagging and dieback of residual elms caused by this fungus disease were widespread again in 1988. It is amazing that we have any elms left at all but a few do manage to survive in isolated situations.

**Mechanical Injury** - During the summer months as homeowners mowed their lawns and manicured their lots we again saw numerous situations involving careless and avoidable mechanical damage such as: direct lawn mower injury to shallow or exposed roots and tree trunks; weed whip girdling of tender barked trees (In most cases the bark was still on the bole but the cambium layer beneath was dead); and injury to various parts of trees from rocks thrown by lawn mowers.

**Sugar Maple Flagging** - Isolated dead branches with brown leaves attached were very evident throughout much of the State this past season. Three weakly parasitic fungi were generally associated with this flagging: Steganosporium (black, tar-like spots on the branch); Nectria cinnabarina (hemispherical, pink-coral-colored, pinhead-sized eruptions) and Cystospora (tiny, raised pustules with a white center).

**Weather-Related Disorders** - Problems related to weather did not seem to be as prevalent or as severe in 1988 as in 1987 except for widespread drought related disorders especially to sugar maple, birch, and beech (See Section B).

Winter related problems were very spotty in 1988. This included isolated reports of injury from snow breakage primarily on plantation pines. There were some spotty pockets of severe late frost injury to balsam fir and to a lesser extent, larch and other conifers as well as maple and aspen throughout the State. Most affected trees had recovered by August. The hemlock problem mentioned in section A was also very likely weather related.

Extensive shedding of short spruce tips which littered the forest floor was noted in some stands of large trees in northern Maine in May. We suspect that this was caused by heavy ice buildup at some time during the winter months.

This completes our summary issue for the 1988 season. We hope that you find this information useful to you. As always, we appreciate your comments and criticism. Such feedback helps us to provide better service to our constituents. We plan to begin our regular 1989 conditions report series sometime in April.

Further information on any entry in this report can be requested by calling or writing to the Insect & Disease Laboratory, 50 Hospital Street, Augusta, Maine 04330 Phone (207) 289-2431.

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